

WE CLAIM:

1. An optical product comprising:
a sheet of material having a surface, the surface comprising a plurality of optical elements comprised of microscopic patterns in the surface that cooperate to produce an image, each of the elements having a focal length, at least some of the focal lengths substantially different from other focal lengths, such that some portions of the surface appear to be closer to a viewer than other portions of the surface.
2. The product of Claim 1, wherein the optical elements comprise Fresnel lenses.
3. The product of Claim 1, wherein the optical elements comprise diffractive optical elements.
4. The product of Claim 3, wherein the optical elements comprise holographic optical elements.
5. The product of Claim 1, wherein at least some of the focal lengths are positive and others of the focal lengths are negative.
6. The product of Claim 1, wherein the microscopic patterns comprise a plurality of grooves formed in the surface.
7. The product of Claim 6, wherein said plurality of grooves have an average spacing of between about 0.5 micrometers to about 2 millimeters.
8. The product of Claim 6, wherein said plurality of grooves have an average depth of between about 0.2 micrometers to about 200 micrometers.
9. The product of Claim 1, wherein said surface is substantially smooth on a macroscopic scale across a plurality of said optical elements.
10. The product of Claim 1, wherein said surface is substantially smooth on a macroscopic scale across a region of 1 centimeter or larger.
11. The product of Claim 1, wherein said sheet of material is substantially transmissive.
12. The product of Claim 1, wherein said sheet of material is reflective such that said image is a reflected image.

13. The product of Claim 12, wherein said sheet of material comprises a reflective layer.

14. The product of Claim 13, wherein said reflective layer comprises a layer of metallization.

15. The product of Claim 13, wherein said reflective layer comprises a thin film dielectric coating.

16. The product of Claim 1, wherein said sheet comprises material selected from the group consisting of paper, polyester, polycarbonate, polypropylene, acrylic, and glass.

17. The product of Claim 1, wherein said sheet further comprises an adhesive.

18. The product of Claim 1, further comprising a laminate disposed over the surface to produce a substantially smooth surface.

19. The product of Claim 1, wherein the sheet comprises a flexible sheet.

20. The product of Claim 1, wherein the sheet comprises a rigid sheet.

21. The product of Claim 1, wherein the optical elements are arranged in a pattern.

22. The product of Claim 1, wherein a plurality of said optical elements having substantially similar focal lengths are included in a first region adjacent to a second region comprising a plurality of optical elements having substantially different focal lengths.

23. The product of Claim 1, wherein a plurality of said optical elements having substantially similar focal lengths are juxtaposed with respect to a background comprising a plurality of optical elements having substantially different focal lengths so as to form a pattern.

24. The product of Claim 23, wherein said pattern comprises a shape selected from the group consisting of a letter, a numeral, a character, and a symbol.

25. The product of Claim 1, wherein said optical elements comprise first and second optical elements superimposed on each other.

26. The product of Claim 25, wherein said microscopic patterns for said first and second optical elements comprise first and second microscopic patterns superimposed over each other.

27. The product of Claim 26, wherein said microscopic patterns for said first and second optical elements comprise first and second sets of rings, respectively, both said first and second sets of rings being concentric about a common center point.

28. The product of Claim 26, wherein said microscopic patterns for said first and second optical elements comprise first and second sets of rings, respectively, said first and second sets of rings being meshed together such that rings from said first set are alternated with rings from said second set along a path from an outer ring toward a central ring.

29. A method of creating an optical effect from an image, the method comprising:

producing ten or more copies of the image arranged in side-by-side relationship, the producing comprising using microscopic patterns in a surface to form some of the copies at different distances from the viewer than other of the copies.

30. The method of Claim 29, wherein said copies are formed by refraction.

31. The method of Claim 29, wherein said copies are formed by diffraction.

32. The method of Claim 29, wherein said copies are formed by reflection.

33. The method of Claim 29, wherein said copies are formed by transmission through said microscopic patterns.

34. The method of Claim 29, wherein said copies are arranged to form a shape selected from the group consisting of a letter, numeral, character, or symbol.

35. The method of Claim 29, wherein 100 or more copies of the image are produced.

36. The method of Claim 29, wherein 1000 or more copies of the image are produced.

37. The method of Claim 29, wherein at least some of the copies comprise virtual images and other of the copies comprise real images.

38. The method of Claim 29, wherein some of the copies are inverted relative to others of the copies.

39. The method of Claim 29, wherein movement of an object that forms said image causes some of the copies to move in a direction with the movement of the object, and others of the copies move in a direction opposite from the movement of the object.

40. A method of creating an optical effect from an image, the method comprising:

producing at least first and second copies of the image at least partially superimposed over each other, the producing comprising using microscopic patterns in a surface to form the first of the copies at different distances from the viewer than the second of the copies.

41. The method of Claim 40, wherein said copies are formed by refraction.

42. The method of Claim 40, wherein said copies are formed by diffraction.

43. The method of Claim 40, wherein said copies are formed by reflection.

44. The method of Claim 40, wherein said copies are formed by transmission through said microscopic patterns.

45. The method of Claim 40, wherein at least the first of the copies comprise a virtual image and the second of the copies comprise a real image.

46. The method of Claim 40, wherein at least the first of the copies is inverted relative to the second of the copies.

47. The method of Claim 40, wherein movement of an object that forms said image causes the first of the copies to move in a direction with the movement of the object, and the second of the copies to move in a direction opposite from the movement of the object.